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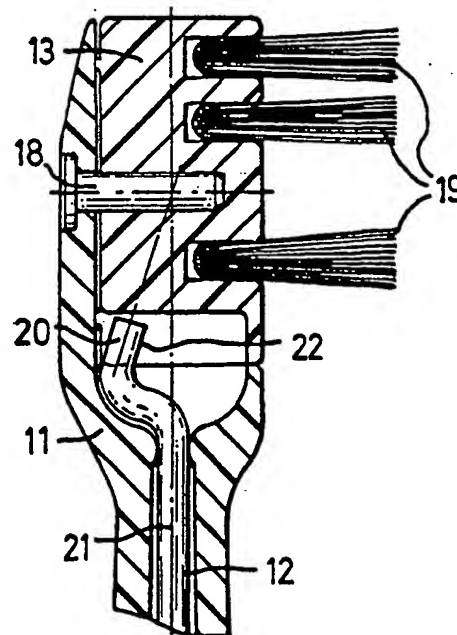
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(21) International Application Number: PCT/GB96/01255 (22) International Filing Date: 24 May 1996 (24.05.96) (30) Priority Data: 08/449,298 24 May 1995 (24.05.95) US (71)(72) Applicant and Inventor: McDOUGALL, Gregory, John [AU/GB]; 5C, Taichi Court, 132 Austin Road, Tsimshatsui, Kowloon (HK). (74) Agent: LUCKHURST, Anthony, Henry, William; Marks & Clerk, 57-60 Lincoln's Inn Fields, London WC2A 3LS (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.	

(54) Title: TOOTHBRUSH

(57) Abstract

An electrical driven toothbrush has a rotatable shaft (12) with a remote end (20) which fits into a slot (22) in a bristle holder (13). The holder (13) is mounted for rotation on a post (18) supported by a head (11). When the shaft (12) rotates, the remote end (20) describes a circle and drivingly engages the slot (22) to cause the holder (13) to vibrate.



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TOOTHBRUSH

The invention relates to toothbrushes.

The invention relates more particularly to electrically driven toothbrushes in which brush bristles are arranged  
5 to be moved relative to the toothbrush handle.

There are many examples of such toothbrushes including the disclosure in 1939 of rotary driven bristles in USA Patent 2215031. A similar rotational drive arrangement is also shown in USA Patent 4845795. USA Patent 4156620 explains  
10 how a rotational motor drive is converted into reciprocal linear motion to drive the bristles rotationally clockwise and counterclockwise. USA Patent 3577579 discloses a toothbrush in which a toothbrush head is moved in relation to a brush holder so that all the bristles mounted in the  
15 brush head move together sideways and backwards and forwards relative to the holder.

The present invention is concerned with moving bristles relative to a toothbrush head to enhance the cleaning action of toothbrushes in use and has as an object to  
20 provide toothbrushes in which relative motion is achieved in a simple and effective manner.

According to the invention there is provided an electrical driven toothbrush having a handle, a head, a rotatable shaft having a longitudinal central axis extending from

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the handle to the head, and a bristle holder pivotably mounted to the head and drivingly engaged by a remote end of the shaft which is off-centre with respect to the central axis so that the brush holder vibrates about its  
5 pivot when the shaft rotates.

The shaft is preferably integrally formed and its remote end is bent away from the central axis.

The bristle holder may have a slot into which the remote end of the shaft fits.

10 The bristle holder may be mounted to rotate about an axis.

The bristle holder may be arranged to vibrate through an angle between  $10^{\circ}$  and  $50^{\circ}$ ; preferably the angle is approximately  $30^{\circ}$ .

A toothbrush according to the invention will now be  
15 described by way of example with reference to the accompanying drawings in which:-

Figure 1 is a sectional bottom view of the toothbrush;

Figure 2 shows a cross-sectional side view of part of the toothbrush;

20 Figure 3 is a sectional bottom view of Figure 2;

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Figure 4 is an opposite side view of Figure 2; and

Figures 5, 6 and 7 are respectively the same views as Figures 2, 3 and 4 of a different toothbrush and to a different scale.

5 Referring to the drawings, in Figure 1 the toothbrush comprises a handle 10, a head 11, a rotatable shaft 12 extending from the handle to the head, and a bristle holder 13. The handle provides compartments for holding an electric motor 14 and two batteries 15 and 16. A shaft  
10 coupling 17 is arranged to grip one end of the shaft 12 and allow the shaft to be pulled out for cleaning or replacement as will be described below.

The head 11, as is better seen in Figure 2, supports a post 18 which provides a rotational pivot axis for the  
15 bristle holder 13. Bristles 19 are shown for illustrative purposes only in Figure 2. The shaft 12 has an integrally formed remote end 20 that is off-set from a central longitudinal axis 21 of the shaft.

The remote end 20 fits into a slot 22 (see Figure 3)  
20 formed in a side of the bristle holder 13. It will be noted that the end 20 points towards an intersection of the axis 21 and a central axis of the post 18. When the shaft 21 is rotated by the motor 14, the remote end 20 describes a circle about the axis 12 and drivingly engages

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the slot 22 to cause the bristle holder 13 to vibrate. Thus, the holder 13 pivots or rotates forwards and backwards about the centre of the post 18. Such vibrations comprise the relative motion between the head 11 and the bristles 19 and is generally beneficial for efficient cleaning of teeth. The width of the slot 22 is preferably generally the same as the diameter of the end 20 to leave minimum play; this keeps noise to a minimum in use.

10 Preferably, the motor 14 runs at around 6000 rpm. Where desired, the motor can run at other speeds or be arranged to run at two or more speeds selectable by the user. Figure 1 shows a toothbrush where the holder 13 vibrates or rotates through an angle of 30°. In Figure 2, the angle 15 is 35° and in Figure 5 the angle is 15°. It will therefore be appreciated that the rotational angle can be chosen by fitting different shafts 12 and that the same bristle holder can be used for all angles.

Each bristle holder 13 may be provided with more than one slot 22 so as to be better balanced or so that different slots can be used if the one slot wears or if the bristles wear unevenly in use. In other words, the holder 13 can then be set up in two or more rotational positions. The holder 13 is preferable easily removable from the head 11, 25 by being spring clipped to the post 18 for example. Such removal allows better cleaning and storing in a hygienic

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container perhaps and also enables the shaft 12 to be readily withdrawn and replaced when required.

The described shafts 12 are preferably integrally formed and shaped as shown. However, it is possible to arrange  
5 for the remote end 20 to be separately formed or provided and fixed to a straight end part of the shaft. Such a separate part can be a brush having a central axis coinciding with the axis 21 of the shaft and an off-centre driving post. The driving post then takes up the position  
10 and function of the remote end 20. Thus, the driving post and the slot 22 then form the driving engagement between the shaft and the holder 13 and so the driving post can be regarded as the remote end of the shaft.

It is also possible, but not usually so convenient, in  
15 some embodiments of the invention to arrange for the holder 13 to be hingedly pivoted at one side, for example opposite the shaft. In such a case, bristles mounted nearer the hinged pivot will not actually move as much as bristles at the side next to the shaft but they will still  
20 vibrate significantly.

It will also be appreciated that whether pivoted to rotate or to hinge, the bristle holder 13 need not be circular. However, a circular holder 13 is normally preferred so that its rotational position can be changed when desired,  
25 as mentioned above.

CLAIMS

1. An electrically driven toothbrush having a handle, a head, a rotatable shaft having a longitudinal central axis extending from the handle to the head, and a bristle holder pivotably mounted to the head and drivingly engaged by a remote end of the shaft which is off-centre with respect to the central axis so that the brush holder vibrates about its pivot when the shaft rotates.
2. An electrical driven toothbrush according to claim 1, in which the shaft is integrally formed and its remote end is bent away from the central axis.
3. An electrical driven toothbrush according to claim 1 or 2, in which the bristle holder has a slot into which the remote end of the shaft fits.
4. An electrical driven toothbrush according to any of claims 1 to 3, in which the bristle holder is mounted to rotate about an axis.
5. An electrical driven toothbrush according to any of claims 1 to 4, in which the bristle holder is arranged to vibrate through an angle between 10° and 50°.
6. An electrical driven toothbrush according to claim 5, in which the angle is approximately 30°.

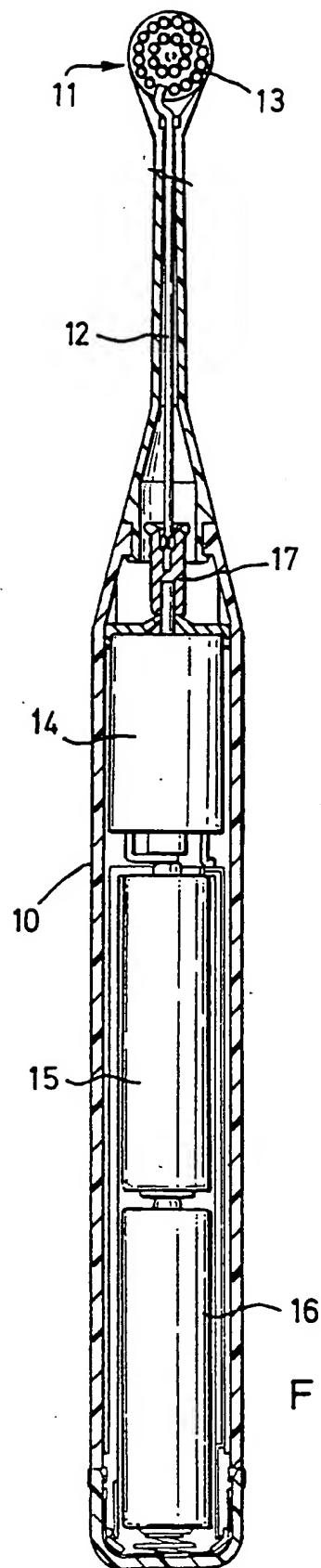


FIG. 1



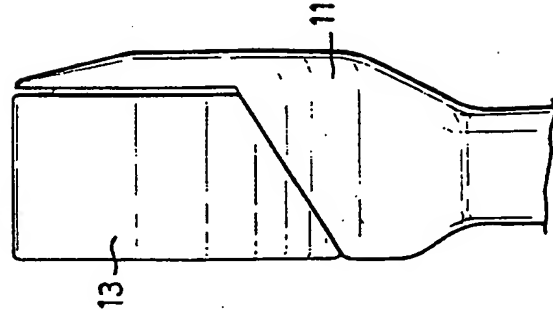


FIG. 4

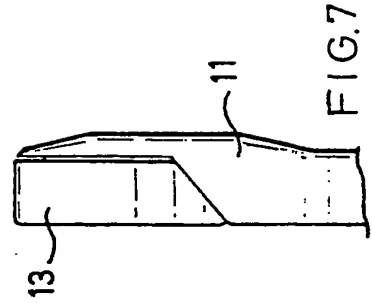


FIG. 7

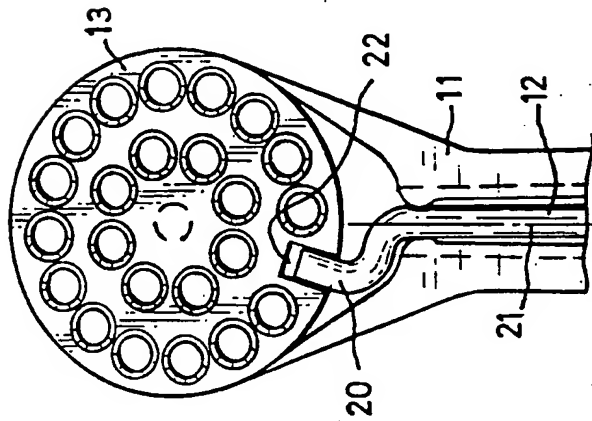


FIG. 3

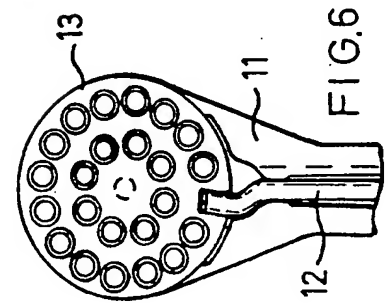


FIG. 6

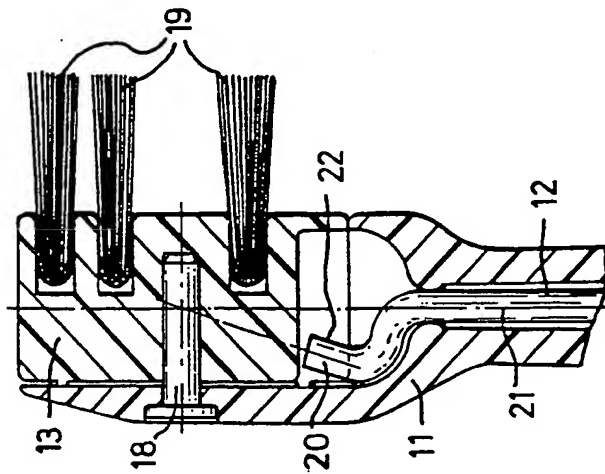


FIG. 2

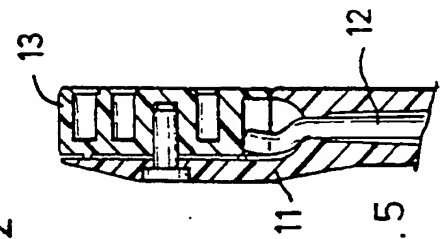


FIG. 5